ROLE OF AQUACULTURE IN SOCIO-ECONOMIC DEVELOPMENT OF EAST SINGHBHUM

Research Proposal for the registration in PhD program

UNIVERSITY DEPARTMENT OF GEOGRAPHY

FACULTY OF SOCIAL SCIENCE

RANCHI UNIVERSITY, RANCHI

2023

Supervisor

DR. SANDEEP CHANDRA
Assistant Professor
PG Dept of Geography
St. Xavier's College, Ranchi

Research Scholar

ARITRA MONDAL
NET JRF

Name of the candidate (Research scholar)- ARITRA MONDAL

Present address- Opp.BOI Atm, Bhuiyan Toli, Samlong, Ranchi -834010

Permanent address- A/18/B, Accounts Colony, Adra-723121

Contact No- 6297669287 / 9064985528

Name of the supervisor- Dr. Sandeep Chandra

Assistant Professor, Dept. of Geography, St. Xavier's College.
Ranchi, Jharkhand, Contact No- 9470562282
Email- sandeepchandra@sxcran.org

Title of the Ph.D Research Project- ROLE OF AQUACULTURE IN SOCIO-ECONOMIC DEVELOPMENT OF EAST SINGHBHUM

1.) Introduction:

Aquaculture or farming in water is the aquatic equivalent of agriculture or farming on land. Defined broadly, agriculture includes farming both animals (animal husbandry) and plants (agronomy, horticulture and forestry in part). Similarly, aquaculture covers the farming of both animals (including crustaceans, fish and molluscs) and plants (including seaweeds, lotus, etc).

According to F.A.O (1988) “Aquatic organisms which are harvested by an individual or corporate body which has owned them throughout their rearing period contribute to aquaculture.”

East Singhbhum boasts a diverse array of rivers, ponds, and lakes that present ample opportunities for the cultivation of various species. Amidst this backdrop, our research endeavours to dive deep into the interplay between aquaculture practices and the socio-economic fabric of local communities. This research proposal embarks on a comprehensive exploration of the pivotal role that aquaculture plays in driving socio-economic development in this dynamic region.

According to *The Dept. of Fisheries East Singhbhum* , located at Karandih , the average fish production is 6500 mt .

The data speaks of 6 major fish farms , and a public owned seed hatchery . There are a total of 23 Cooperatives of fishermen functional in the district .

Major rivers include Swarnrekha and Kharkai , while several dams such as Dimna, Jadugoda, etc also are significant locations , identified by the Dept. of Fisheries East Singhbhum .

This research proposal aspires to shed light on the transformative potential of aquaculture as a catalyst for socio economic empowerment in East Singhbhum. Some of the common organisms that are part of aquaculture includes -

- Various species of fish such as Tilapia , Catla , Tengra , etc .
- Crustaceans like prawns .
- Molluscs (mussel) that produces Pearls.
- Aquatic Plants such as Water lily, Lotus, etc .

These species may have edible, decorative and even medicinal uses therefore attracting for research for adoption of best practices to maximise gains and minimise losses .

2.) State of the art:

'Remarkable advances are being achieved on an increasing scale, and development and donor agencies now consider aquaculture to be a priority area. Aquaculture has become a prime subject for research internationally' (Pillay 1990). The current state of research on the role of aquaculture in the socio-economic development of a region reflects a growing interest in understanding the potential benefits and challenges associated with this thriving industry. As of now, several studies have been conducted, offering valuable insights into various aspects of aquaculture's impact on a region's socio-economic landscape.

Research findings indicate that aquaculture has emerged as a viable and lucrative source of income for local communities, with many small-scale farmers reporting substantial financial gains. 'Freshwater prawn farming offers diverse livelihood opportunities for a large number of rural poor'(Ahmed 2008) The industry's role in poverty alleviation and employment generation has also been examined, emphasizing its potential to improve livelihoods and enhance economic resilience. 'Inland fishing has been a winner for 35,000 households in four states, providing an extra source of income and paving the pathway to a brighter future.' (Chako 2020)

Scholars have explored the market dynamics and value chain of aquaculture. These studies have identified key challenges in terms of marketing infrastructure, distribution networks, and quality standards, etc . Regarding present market demand, it must be mentioned 'The fish production from capture fisheries (96 million tonnes) is almost stagnant for many decades but the demand is rising significantly due to the awareness about the health benefits of fish consumption' (Swain 2022) . 'Fish is significant as one-quarter of population, numbering around 300 million people, consumes fish in India. It contributes about 44 per cent of non-vegetarian protein'.(Baraik 2016), indicating the huge domestic demand itself waiting to be fulfilled .

Studies have highlighted the close link between aquaculture and the social fabric of the region, emphasizing its role in strengthening community bonds and preserving cultural heritage. But research has also found disturbance to social fabric as mentioned , 'Theft and, occasionally, sabotage have blighted some operations. Blame that on not-so-neighbourly jealousy'(Chako 2020). Some studies have discussed the social dimensions of aquaculture , as in a study regarding aquaculture in Purulia district highlights ' this is a male-dominated

occupation (98.3%). Most of the aquaculture farmers have basic literacy (50.5%) and possess medium size family (60.82%)' (Patra 2019)

As mentioned among many techniques in the Handbook on Aquaculture some are 'All ponds were fertilized using raw cattle dung @ 5000 kg ha'(Ayyapan 2011), 'The water with hardness of 100 mg/L is considered good for fish culture'(Ayyapan 2011), thus researchers have explored the potential of modern techniques, such as recirculating aquaculture systems and improved breeding practices, to enhance productivity and profitability. These studies provide valuable guidance for farmers seeking to adopt efficient and sustainable technologies.

As the region's aquaculture industry continues to evolve, research endeavours are expected to further enrich our understanding and guide policies that promote socio-economic development in East Singhbhum.

3.) Problems to be investigated

For a research study on the role of aquaculture in the socio-economic development of East Singhbhum, several key problems can be investigated to gain a comprehensive understanding of the industry's impact. Some problems to be investigated for the research may include-

a) What is the spatial location, extent, and distribution of aquaculture in East Singhbhum district?

b) What is the economic contribution of aquaculture in East Singhbhum?

c) What are the social and cultural significance of aquaculture in the region?

d) What are the specific challenges faced by small scale aquaculture farmers?

During the course of the research, new avenues of investigation might open up which may also be explored.

4.) Objectives of the investigation and motivation

By addressing the following research objectives, the study aims to provide comprehensive insights into the multi-faceted role of aquaculture in the socio-economic development of East Singhbhum.

a) To map the spatial location, extent, arrangements, organisations and distribution of aquaculture in East Singhbhum
b) To quantify the financial benefits of the aquaculture industry in East Singhbhum, including its role in income generation, employment opportunities, and poverty alleviation among local communities
c) To examine the social and cultural significance of aquaculture in the region, including its role in community identity, traditional practices, and social cohesion.
d) To analyse the existing regulatory frameworks and policies governing aquaculture in East Singhbhum
e) To investigate the extent of technological adoption in the aquaculture sector in East Singhbhum
f) To identify the issues, challenges faced by aquaculture farmers in the area

The study will try to include not only traditional fish farmers but other emerging and diverse activities such as, aquatic plant cultivation like Lotus which provides edible Makhana, pearl cultivation from molluscs, etc. .

5.) Hypothesis:

- Aquaculture positively impacts income generation, employment opportunities, and poverty alleviation among local communities.
- Aquaculture fosters socio-cultural cohesion within local communities.
- Efficient market access in Aquaculture enhance profitability for aquaculture farmers.

These hypotheses may be tested through quantitative data specially for hypothesis of economic dimensions and both quantitative and qualitative for hypothesis of social dimensions.

As we design our study and collect data, these hypotheses will guide our investigations and help us draw meaningful conclusions.

This hypothesis suggests that we expect aquaculture to have a substantial and positive effect on the socio-economic aspects of the region. Through our research, we will aim to test and support this hypothesis by collecting and analysing data on the impact of aquaculture.

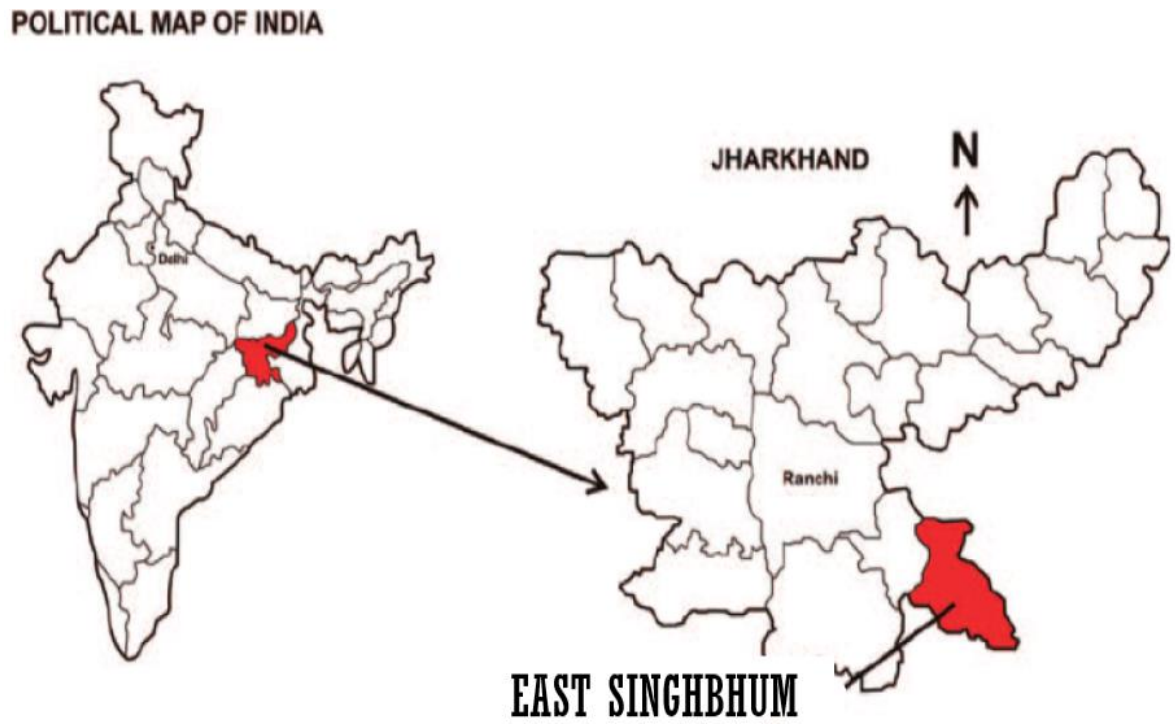
6) Research Design and Methodology:

Selection of field

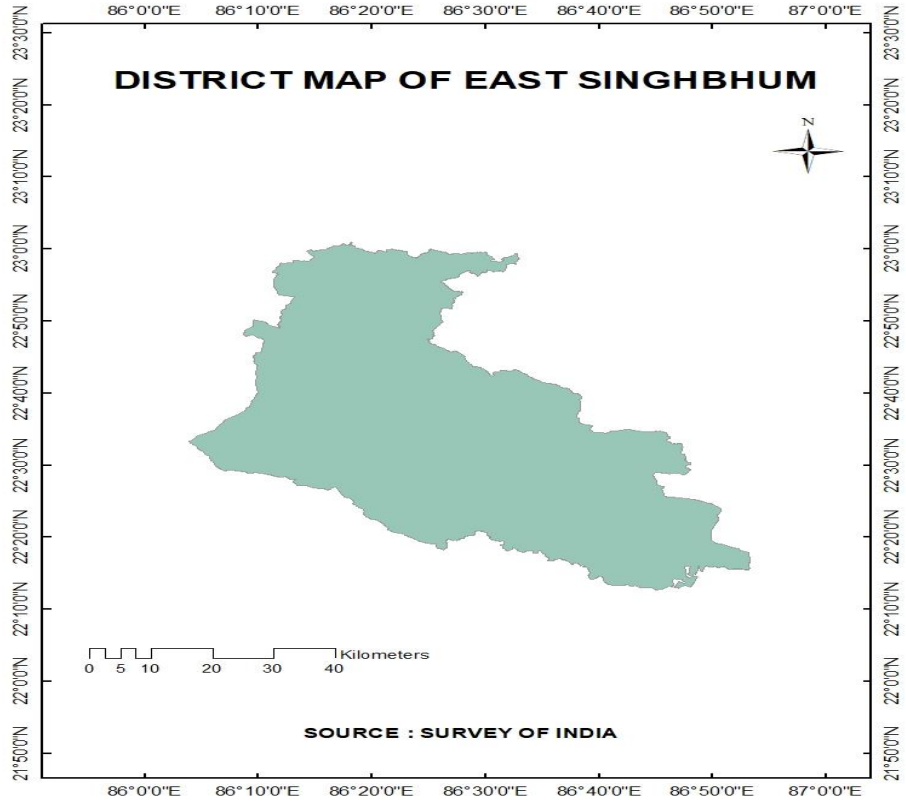
Situated in the picturesque landscapes of Jharkhand, India, East Singhbhum holds immense potential for sustainable fish farming and aquatic cultivation. With its broad range of rivers, lakes, and ponds, the region offers a fertile ground for cultivating a wide variety of species.

The proposed work will be an attempt to shed light on the transformative potential of aquaculture as a catalyst for socio economic empowerment in East Singhbhum.

There is a higher possibility of Aquaculture playing an important role in East Singhbhum as it is comparatively not Water deficient, allowing the practice to continue throughout the year .



Map highlighting East Singbhum district in Jharkhand, India



Map showing East Singhbhum District

Methodology:

- **Pre field :**To locate aquatic areas through satellite imagery , choose samples , prepare questionnaires
- **Literature review:** Review existing literature, research papers, and reports related to aquaculture, aquaculture practices, and aquaculture outcomes.
- **Data collection:** Conducting surveys, interviews, and focus group discussions with aqua farmers, industry stakeholders, and relevant government authorities to gather data. Secondary data on Household data, income and expense by production, type of cultivated species , supply chain , local market shares, etc can be collected.
- **Sample design:** Top five blocks based on highest percentage of water body among the 11 blocks can be selected, further based on the same criteria , top 5 villages in each block can be selected , and 5-10 households from each village can be sampled , generating a total sample of about 200 households . The sample's dynamics will try to adhere to the characteristics of the population.
- **Field visits:** Visit aquaculture farms and processing units to observe the production processes and assess socio-economic conditions.

- **Data analysis**: Analyse the collected data using statistical tools and qualitative methods to draw meaningful insights. Software's such as SPSS , QGIS , etc can be put to use. For this descriptive and inferential analysis can be used as and where required .

Tentative Chapterisation :-

- Introduction

1- Geographical environment of Aquaculture

2- Distribution of Water bodies in East Singhbhum

3- Types and pattern of Aquaculture in East Singhbhum

4- Socio-Economic impact of Aquaculture in East Singhbhum

5- Aquaculture- Challenges and Constraints in the area

6- Policy and institutional interventions

7- Case Studies

-Conclusion

- References

7) Sources of data and tools to be used in collection of data

Data Collection: Data can be gathered for the study by conducting ground surveys, interviews, and focus group discussions with aquaculture farmers, industry stakeholders, and relevant government authorities to gather primary data. GPS can be used to record the location of aquaculture sites, later on map can be produce showing spatial distribution of aquaculture activity in the area. Questionnaire, schedule methods can also be used for collecting certain information. For the study periodic visits to aquaculture farms and processing units to observe the production processes, therefore collecting primary authentic data . Secondary data can be collected from relevant Government authorities such as Dept. of Fisheries, etc .

8) Analysis of Data

Analysing data while researching problems and prospects of aquaculture in East Singhbhum District involves several steps to draw meaningful insights and conclusions. For this descriptive and inferential analysis can be used as and where required.

Cleaning the data to remove any errors and ensure data is properly formatted and organized for analysis. Statistical tools such as mean, median, standard deviation can be used to better understand the data. Hypothesis Testing may also be conducted while analysing the data

through available statistical tests such as Z test, T test , etc , as appropriate for the collected data.

Finally, Interpretation and Discussion of the results obtained from the data analysis. It's important to use appropriate statistical software and tools for data storage and analysis such as IBM SPSS , R , etc . for mapping QGIS, ArcGIS applications can be used. To locate prospect and probable sites of aquaculture satellite imagery with good spatial resolution can be used. For satellite image analysis software application such as ERDAS and QGIS can be used.

9) Significance of the Study

Research on the role of aquaculture in the socio-economic development of East Singhbhum can have several significant implications, Aquaculture can contribute to the local economy by providing employment opportunities for the community involved. Aquaculture can increase the availability of fish as a source of nutrition for the local population. Integrating aquaculture with traditional agricultural practices can lead to a more diverse and resilient farming system.

It's important to note that the positive impacts of aquaculture depend on adopting sustainable and responsible practices. Careful consideration of social and economic aspects is essential to ensure the long-term benefits of aquaculture in East Singhbhum.

These significant goals are the motivation of the research, therefore conducting the research becomes significant for the progress of the East Singhbhum population.

10) Relevance to present day problems and need to the society

Research on the role of aquaculture in the socio-economic development of East Singhbhum District holds significant relevance for society for several reasons:

Food Security: Understanding the contribution of aquaculture to the region’s food supply is crucial for ensuring food security for the local population.

Poverty Alleviation: By examining the socio-economic impact of aquaculture, the research can identify how the industry plays a role in poverty alleviation.

Sustainable Resource Management: Investigating the sustainability of aquaculture can help develop best practices that minimize negative impacts on water resources and biodiversity.

Livelihood Diversification: The research can explore how aquaculture offers an alternative livelihood option for farmers and communities, reducing dependency on traditional agricultural activities.

Policy Formulation: Policymakers can use this knowledge to develop targeted policies

Regional development: The research can highlight the role of aquaculture in contributing to regional development

Overall, the research on the role of aquaculture in the socio-economic development of East Singhbhum District can have far-reaching implications for the well-being and prosperity of the local population.

11) Contribution to existing knowledge

Conducting research on the role of aquaculture in the socio-economic development of East Singhbhum District can make valuable contributions to existing knowledge in several ways:

Regional Context: The research will provide specific insights into the socio-economic impact of aquaculture in East Singhbhum District. It will offer a localized understanding of how the industry contributes to the region's development, which can be used as a reference for similar areas facing comparable challenges and opportunities.

By collecting and analysing data from the region, the research will offer empirical evidence on the actual contribution of aquaculture to income generation, employment, poverty alleviation, and other socio-economic factors. This data-driven approach can strengthen the understanding of aquaculture's role in development and inform evidence-based policies.

12) Future Work

Some potential areas for future research include:

Long-Term Impact Assessment: Conducting longitudinal studies to track the long-term impact of aquaculture on socio-economic indicators in East Singhbhum. This would allow for a deeper understanding of how the industry's contributions evolve over time and its sustained effects on the region's development.

Comparative Studies: Undertaking comparative studies between different regions or districts to assess variations in the socio-economic impact of aquaculture. Comparing areas with varying

aquaculture practices, market access, and policy frameworks can reveal best practices and lessons for informed decision-making.

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Signature and approval of supervisor

Dr. Sandeep Chandra
Assistant Professor
PG Department of Geography
St. Xavier’s College, Ranchi
Ranchi University, Ranchi